

TOUCH SCREEN OVERLAY APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates in general to a user input device for use in association with a touch screen and, in particular, to a membrane overlaid in registration with a rigid touch screen to provide or otherwise improve the tactile qualities associated with data input by a user via the rigid touch screen.

[0003] 2. Background Art

[0004] Touch screens as user input devices have recently become popular in mass-market consumer electronic devices. For instance touch screens can be found in cellular telephones, cordless telephones, cash registers, personal digital assistants (PDA's), watches, calculators, kitchen appliances and many other electronic devices and generally comprises a rectangular rigid surface on which is displayed a plurality of "keys" or "buttons" which when touched by the user will cause the device to execute an associated command or function.

[0005] A touch screen typically electrically displays one or more visual cues to the user/operator and may provide multiple "keyboard" designs to facilitate operation in different modes and serves to register user input provided in association with such cues. While it is known that touch screens can be constructed of semi-rigid materials such as plastic, semi-rigid materials typically are not sufficiently resilient and robust for use in consumer electronics. Additionally, standard LCD or liquid crystal technologies favored in touch screens typically operate best in association with rigid, glass-type surface materials. Consequently, the mass-market consumer electronics industry favors the use of a rigid top surface in the construction of such touch screens. Unfortunately, the very reason these rigid materials are favored by the industry makes them less desirable for the consumer. For instance, the rigidity of the touch screen does away with the manual "depression" of the input regions and use of same may be less comfortable than when using a standard keypad, keyboard or like input device. Furthermore, the rigid surface provides little, if any, tactile cue or feedback to user to indicate where to touch the screen or whether sufficient pressure has been applied for registration by the device—inasmuch as there is no travel to the key or button.

[0006] Accordingly, it is an object of the present invention to provide an overlay for use in association with the rigid top surface of a touch screen that alleviates some of the undesirable characteristics of these rigid top surface. It is an associated object of the present invention to provide a relatively inexpensive and replaceable shield that can protect the touch screen surface.

[0007] Additionally, rigid, transparent substrates by their very nature are smooth, fiat surfaces. While this construction is a virtual necessity for the video display aspect of touch screens, the rigid uniform surface fails to provide tactile landmarks to assist for the user. Thus, the use of a touch screen typically requires the user to look directly at the touch screen to view the one or more visual cues displayed thereon in order to identify where upon the touch screen surface the user is to make contact (either with a stylus, finger or other

instrument) in order to input the desired command or activate the device in the intended manner. This is particularly unsatisfactory in certain cellular telephone environments, where the lack of tactile landmarks (and the focus on visual cues) invariably requires the user using a cellular telephone while driving to visually focus on the telephone rather than the road, thus, making the placement of a telephone call from an automobile difficult if not dangerous.

[0008] Accordingly, it is yet another object of the present invention to provide a tactually perceptible surface for use in association with a pre-existing rigid touch screen.

[0009] In touch screens, the device's recognition of a user's input is achieved through various methods including, but not limited to, capacitive-sensitive switches, membrane switches, pressure switches, and various high-frequency light sensing arrays. Some of these technologies require the use of styluses made of materials having certain electrical characteristics to ensure proper operation of the device. These separate styluses can be easily lost.

[0010] Accordingly, it is a further object of the present invention to provide a flexible membrane having electrical characteristics substantially identical to those of the stylus, which is maintained in registration with the touch screen so as to expedite and simplify use of the touch screen.

[0011] These and other objects of the present invention will become obvious in light of the present specification, drawings and claims.

SUMMARY OF THE DISCLOSURE

[0012] The present disclosure is directed to a touch screen overlay apparatus for use in association with a touch screen having a substantially rigid contact surface. The touch screen may have one or more indicia displayed thereon, as is known in the art. The touch screen is generally disposed within a housing and has a periphery with top, bottom, left and right edges. The touch screen overlay apparatus includes a substantially flexible membrane and means for removably maintaining the membrane in a predetermined position over the rigid contact surface of the touch screen. In particular, the size of the flexible membrane is sufficient to cover at least a desired portion of the indicia which may be displayed on the contact surface. The membrane's flexibility provides a more desirable tactile sensation for the user than that provided by the rigid touch screen.

[0013] In a preferred embodiment, the membrane includes one or more raised dome-shaped regions. Each of these domes is disposed on the flexible membrane so as to be in substantial registration with a respective one of the anticipated indicia. These raised dome-shaped regions may be formed integrally to the membrane or may be formed by adding additional material to the upper surface of the membrane. It is further deemed within scope of present invention to use a substantially rigid overlay which incorporates flexible regions selected to correspond to regions where "keys" may be displayed.

[0014] The membrane is removably maintained in a predetermined position superimposed on at least the desired portion of the indicia displayed on the touch screen. The means for removably maintaining may take many forms. For instance, it may comprise a frame having one or more rigid or semi-rigid members, such that the membrane can be